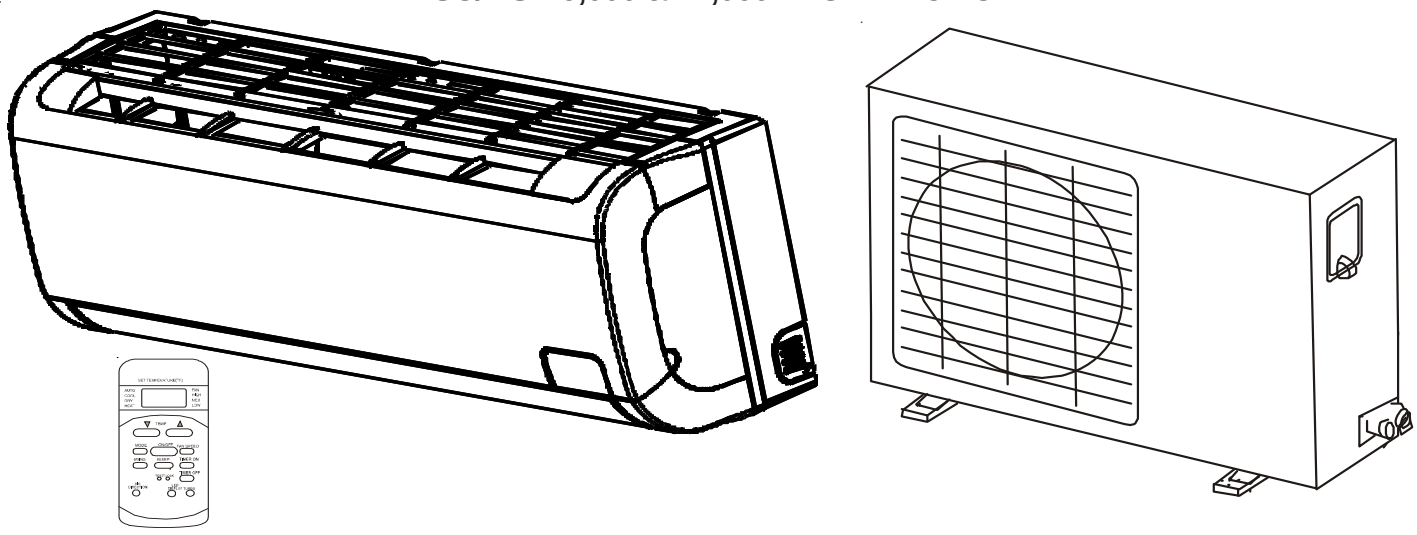
INSTALLATION & OPERATIONS MANUAL

SPLIT TYPE ROOM AIR CONDITIONER AND HEAT PUMP MODELS
MSC/MSH 9,000 & 12,000 BTUH • 115 VOLT



Important Safety Instructions

The following symbols and labels are used throughout this manual to indicate immediate or potential safety hazards. It is the owner's and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of personal injury, property damage, and/or product damage.

⚠ WARNING

HIGH VOLTAGE!
Disconnect ALL power before servicing.
Multiple power sources may be present.
Failure to do so may cause property damage, personal injury or death.

⚠ WARNING

<u>ONLY</u> individuals meeting the requirements of an "Entry Level Technician", at a minimum, as specified by the Air Conditioning, Heating and Refrigeration Institute (AHRI) may use this information. Attempting to install or repair this unit without such background may result in product damage, personal injury, or death.

⚠ WARNING

Goodman will not be responsible for any injury or property damage arising from improper service or service procedures. If you perform service on your own product, you assume responsibility for any personal injury or property damage which may result.

⚠ WARNING

To prevent the risk of property damage, personal injury, or death, do not store combustible materials or use gasoline or other flammable liquids or vapors in the vicinity of thi appliance.

⚠ WARNING

To prevent heat releated illness or death, do not use this device for unattended cooling of persons or animals unable to react to product failure. Failure of unattended air conditioner may result in extreme heat in area intended for cooling, causing heat-related illness or death of persons or animals.

Shipping Inspection

Always keep the unit upright; laying the unit on its side or top may cause equipment damage. Shipping damage, and subsequent investigation is the responsibility of the carrier. Verify the model number, specifications, electrical characteristics, and accessories are correct prior to installation. The distributor or manufacturer will not accept claims from dealers for transportation damage or installation of incorrectly shipped units.

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Codes & Regulations

This product is designed and manufactured to comply with national codes. Installation in accordance with such codes and/or prevailing local codes/regulations is the responsibility of the installer. The manufacturer assumes no responsibility for equipment installed in violation of any codes or regulations.

The United States Environmental Protection Agency (EPA) has issued various regulations regarding the introduction and disposal of refrigerants. Failure to follow these regulations may harm the environment and can lead to the imposition of substantial fines. Should you have any questions please contact the local office of the EPA.

Installation Considerations

To ensure that the unit operates safely and efficiently, it must be installed, operated, and maintained according to these installation and operating instructions and all local codes and ordinances, or, in their absence, with the latest edition of the National Electrical Code. The proper installation of this unit is described in the following sections. Following the steps in the order presented should ensure proper installation.

⚠ CAUTION

MOUNT WITH THE LOWEST MOVING PARTS AT LEAST 2.4m (8 ft.) ABOVE FLOOR OR GRADE LEVEL.

INDOOR UNIT

⚠ CAUTION

To avoid property damage, personal injury or death due to electrical shock, do not use an extension cord with this unit.

- Do not expose unit to excessive heat.
- Select a location where there are no obstructions in front or the sides of the unit.
- Be sure that placement of the unit allows adequate condensate drainage.
- Do not install near a doorway.
- Ensure that the spaces indicated by the arrows is from the wall, ceiling or other obstacles (See minimum clearances required in Figure 1.)
- Noise prevention should be considered when installing the unit.
- Do not place the unit closer than 3 ft. (1m) to a TV or radio.
- Consideration should be given to the distance from furniture, curtains, or other obstructions that will interfere with the unit's airflow.
- Do not exposure the unit direct sunlight. Exposure will fade the cabinet and affect its appearance. Sunlight prevention should be considered in placing the unit.

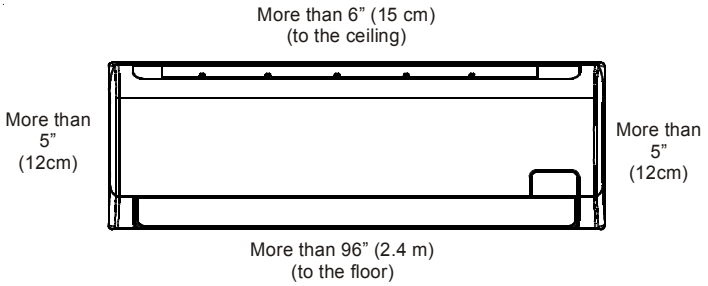


Figure 1

OUTDOOR UNIT

When placing the outdoor unit, consider any obstructions that may constrict the air inlet or outlet. (See Figure 2).

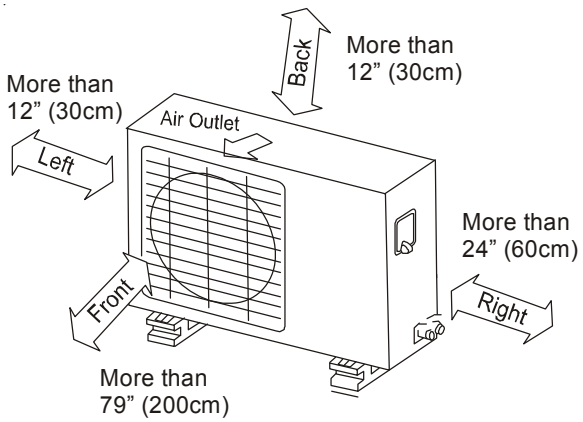


Figure 2

- Locate the outdoor unit in a location that will not obstruct discharge air from the condenser.
- Do not install outdoor unit in a corrosive environment.
- Keep the clearances from the wall or other obstacles as indicated by the arrows on Figure 2.
- Do not place animals or plants in the path of the air inlet or outlet.

- Select a location where noise, vibration and hot discharged air will not be an issue.
- Do not install where high frequency equipment is used (wireless equipment, welding machine, medical facility) as it may interfere with the unit's operation.

Rooftop Installations

If it is necessary to install the outdoor unit on a roof structure, ensure the roof structure can support the weight and that proper consideration is given to the weather-tight integrity of the roof. Since the unit can vibrate during operation, sound vibration transmission should be considered when installing the unit. Vibration absorbing pads or springs can be installed between the condensing unit legs or frame and the roof mounting assembly to reduce noise vibration.

Tools

Level gauge
Screwdriver
Electric drill, hole core drill (65mm)
Flaring tool set
Torque wrenches
1.8kgf.m 13 ft-lb
4.2kgf.m 30 ft-lb
5.5kgf.m 40 ft-lb
6.6kgf.m 48 ft-lb
Hexagonal wrench (4mm)
Gas leak detector
Vacuum pump
Gauge manifold
Users manual
Thermometer
Multimeter
Pipe cutter
Measuring tape
Spanner (half union)

PARTS

No.	Description	Quantity
1	Installation Plate	1
2	Clip Anchor	8
3	Self-tapping Screw A ST3.9x25	8
4	Seal (on selected models	1
5	Drain joint	1
6	*Connection Pipe Assembly	*See Note
	Liquid Side 1/4" (Φ 6.35)	
	Gas Side 3/8" (Φ 9.52) 1/2" (Φ12.7)	
7	Remote Control	1
8	Self-tapping Screw B ST2.9x10	2
9	Remote Control holder	1

*Parts must be purchased separately. Consult dealer for pipe sizes. (Minimum pipe wall thickness of 1/32" (0.7 mm) is recommended)

NOTE: Parts listed are provided with the unit except where noted. Any additional parts required must be purchased separately.

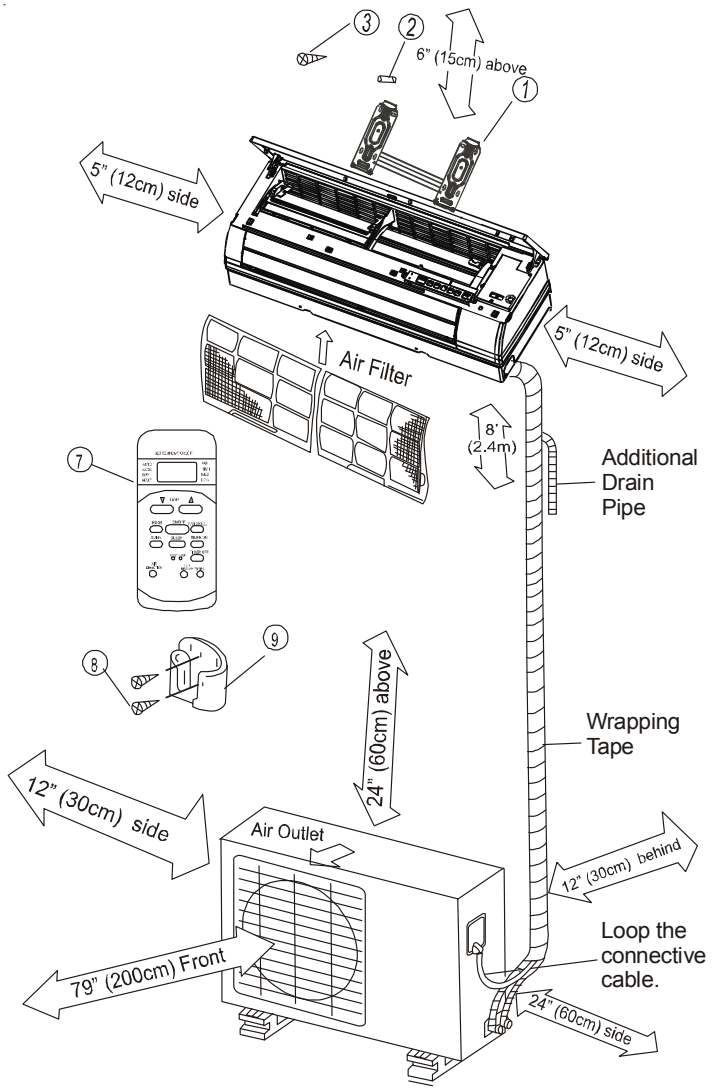


Figure 3

NOTE: Copper lines must be insulated independently.

IMPORTANT NOTES:

- A stud finder should be used to locate studs and prevent unnecessary damage to the wall.
- A minimum pipe run of 10' (3 meters) is required to minimize vibration and excessive noise.

Indoor Unit Installation

Installation of Mounting Bracket

1. Install the mounting bracket horizontally and securely to the wall, allowing room for access on either side of the unit.
2. If the wall is constructed of brick, concrete or similar material, drill eight (8) 3/16" (5 mm) diameter holes in the wall. Insert the clip anchor for appropriate mounting screws.
3. Install the mounting bracket on the wall with eight (8) type "A" screws.

NOTE: Install the mounting bracket and drill the holes in the wall according to the wall structure and the corresponding mounting points on the mounting bracket. (The mounting brackets vary according to the model.)

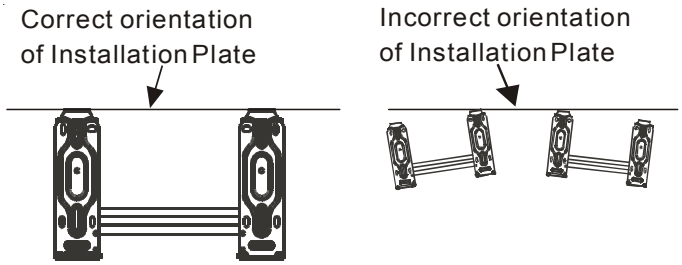
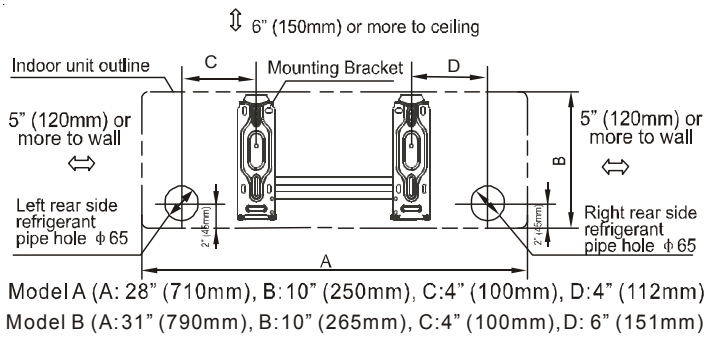


Figure 4

4. Determine the hole positions according to the diagram detailed in Figures 5A & 5B. Drill one (1) 2.5" hole (ϕ65mm), slanting slightly to the outside.

   NOTE: Always use wall hole conduit when drilling metal grid, metal plate, etc.



Model A (A: 28" (710mm), B:10" (250mm), C:4" (100mm), D:4" (112mm)
Model B (A:31" (790mm), B:10" (265mm), C:4" (100mm), D: 6" (151mm)

Figure 5A

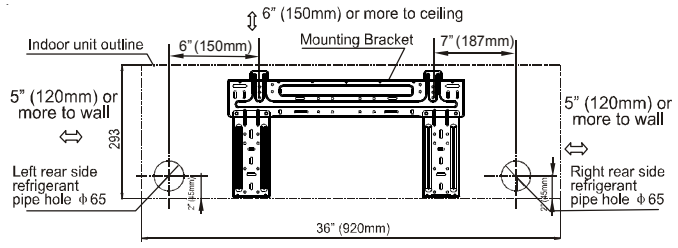


Figure 5B

Refrigerant Piping & Condensate Piping Installation:

5. Drain hose should be installed with a slight downward slope. (See Figure 6.)

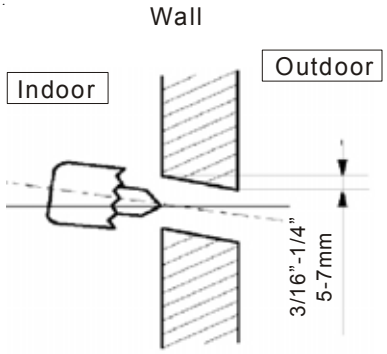


Figure 6

Do **NOT** install drain hose as shown in Figure 7.

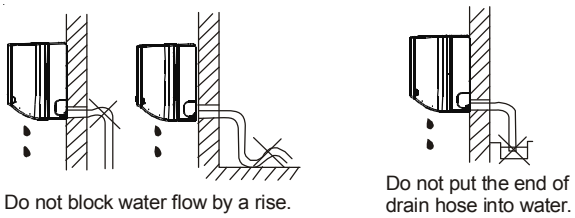


Figure 7

6. When connecting extension drain hose, insulate the connecting part of the extension drain hose with a shield pipe. Do not allow the drain hose to be slack.
7. **REFRIGERANT PIPING INSTALLATION**:: For the left-hand and right-hand piping, remove the pipe cover from the side panel. (Figure 8.)

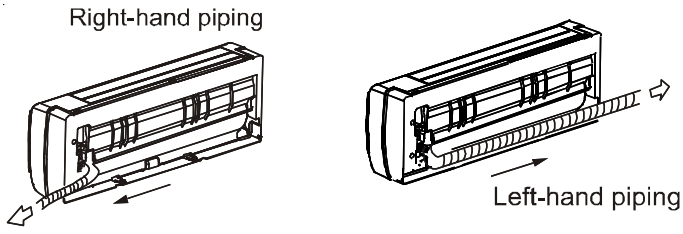


Figure 8

8. For the rear right-hand and rear left-hand piping, install as shown in Figure 9.

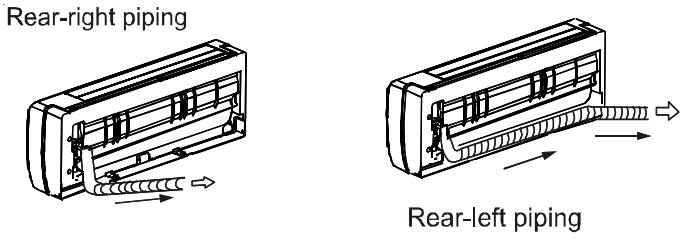


Figure 9

To make refrigerant tube connections, refer to Tightening Connection in the Refrigerant Piping Connection.

Indoor Unit Installation

9. Pass the piping through the hole in the wall.
10. Place the upper claw on the back of the indoor unit on the upper hook of the installation plate. Move the indoor unit from side to side to ensure it is securely mounted. (See Figure 10).

    NOTE: By placing cushioning material between the indoor unit and the wall, placement of piping is easier (see Figure 11). REMOVE CUSHIONING MATERIAL AFTER PIPING IS COMPLETED.

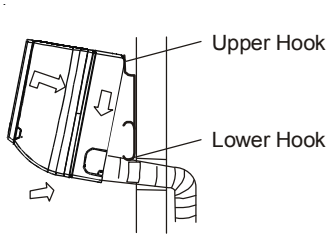


Figure 10

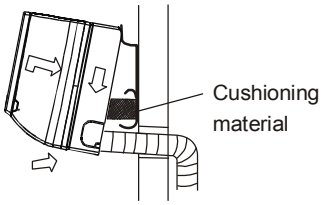


Figure 11

11. Push the lower part of the indoor unit up on the wall. Move it from side to side, up and down to ensure the unit is hooked securely.

Piping and wrapping

Evenly bundle the tubing, connecting cable and drain hose securely with tape as shown in Figure 12.

Because the condensed water from the rear of the indoor unit gathers in the drain pan and is piped out of the room, do not put anything else in the drain pan.

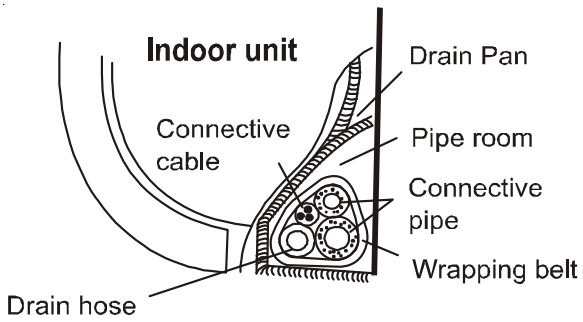


Figure 12

IMPORTANT NOTES:

- Indoor unit must be connected before the outdoor unit.
- Drain hose should not be allowed to become slack.
- Insulate both the auxiliary pipings.
- Ensure that the drain hose is positioned at the lowest side of the bundled tubing. Positioning it at the upper side can cause the drain pan to overflow inside the unit.
- Drain hose should be sloped downward to ensure condensate will drain correctly.

⚠ CAUTION

Do not allow piping to hold indoor unit away from the wall.
Never intertwine power wiring and other wiring.

Outdoor Unit Installation

Outdoor Installation precautions

- Install the outdoor unit on a rigid base to prevent noise level and vibration.
- Place the outdoor unit in such a manner to minimize restriction of discharge air.

  Protect the unit from prevailing winds. To ensure the unit operates correctly, place the unit lengthwise along a wall or use a dust or shield plate.

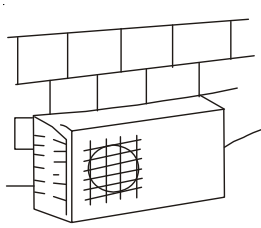


Figure 13A

In strong wind conditions, install lengthwise against a wall.

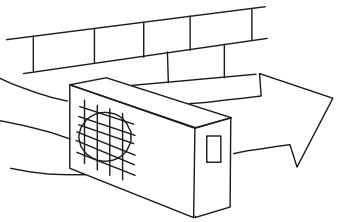


Figure13B

In strong wind conditions, do NOT install as above.

- If a wall mount installation is required, the installation bracket should meet the requirement in the installation bracket diagram and the wall should be able to support the installation.
- Be sure there are no obstacles blocking air discharge.

  The installation wall should be constructed of brick, concrete or another surface of equal strength to hold the unit safely. Make sure the connections to the wall, bracket and unit are firmly seated and there are no obstructions to the airflow.

Anchoring the outdoor unit

The unit should be tightly anchored, horizontally, with a nut and bolt (ϕ 10 or ϕ 8) on a concrete or similarly rigid, stable surface.

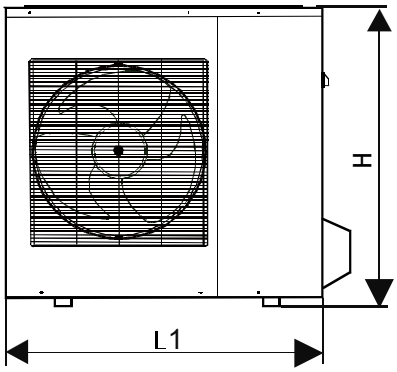


Figure 14A

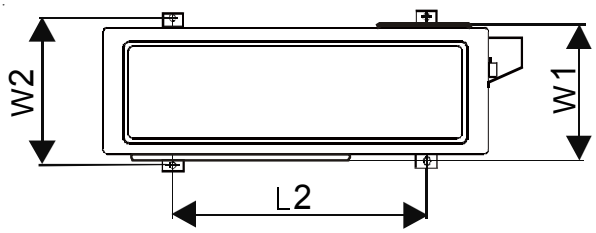


Figure 14B

MS* 9 & MS*12 Outdoor Unit Dimensions	Mounting Dimensions	
Inches/mm (L1xHxW1)	L2 (mm)	W2 (mm)
30" x 23" x 11" 760 x 590 x 285	21" 530	11 1/2" 290

Drain joint installation

NOTE: Drain joints differ slightly according to the different outdoor units. Inspect your unit and use the installation instructions for your specific unit.

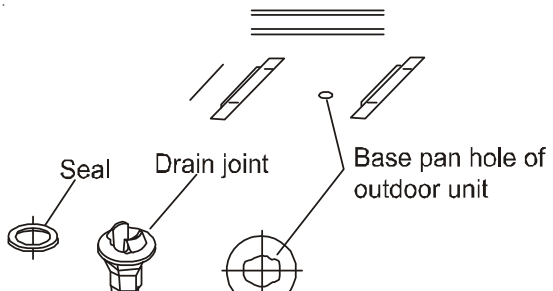
For drain joints with seals (Figure 15A):

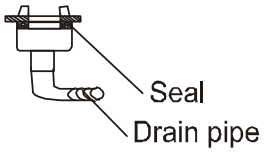
- Slide the seal onto the drain joint and insert into the base pan hole of the outdoor unit. Rotate 90° to secure (see Figure 16).

For drain joints without seals (Figure 15B):

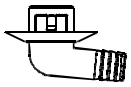
- Insert the drain joint into the base pan hole of the outdoor unit until it remains fixed, accompanied by a clicking sound.

NOTE: For protection against water condensation off the outdoor unit during heating mode, connect the drain joint with an extension drain hose (provided by the installer)

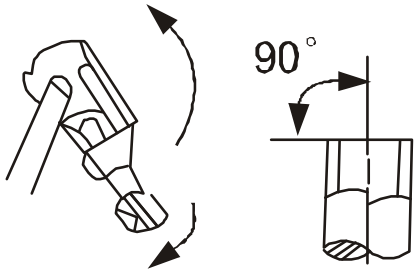




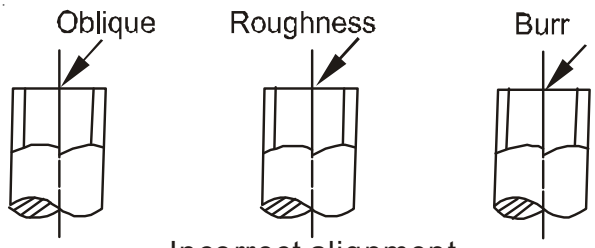
(Figure 15A)



(Figure 15B)



Correct alignment



Incorrect alignment

Figure 16

Refrigerant Pipe Connection

NOTE: The main cause of refrigerant leaks is due to defective flare connections.

Make flare connections using the following procedure:

1. Remove the flare nuts attached to the indoor and outdoor units. Before flaring, slide them over the tubing. It is not possible to put them on after flaring tubes.

2. Insert tube in flare tool to measurement “A” in chart. Flare tubing as shown in Figure 19. Make sure flare is free of burrs and completely formed to make a leak proof joint.

   NOTE: In order to avoid dropping burrs into the tubing, angle the end of the copper tube/pipe in a downward direction as you remove the burrs.

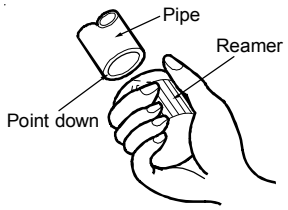


Figure 17

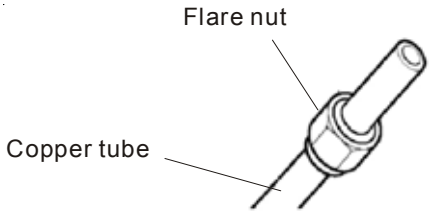


Figure 18

4. Flare Connections: Firmly hold the copper pipe in a die with the dimensions as in the following table.

Model	Outdoor Diameter (inches & mm)	A (inches & mm)	
		Max.	Min.
MS* 09 & 12	1/4" (Φ 6.35)	3/64" (1.3)	1/32" (0.7)
MS*09	3/8" (Φ 9.52)	1/16" (1.6)	3/64" (1.0)
MS*12	1/2" (Φ12.7)	1/16" (1.8)	3/64" (1.0)

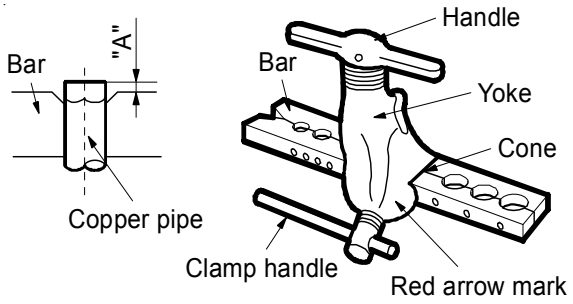


Figure 19

5. Tightening the connection:

- Align the center of the pipes and finger-tighten the flare nut. Using a spanner and torque wrench (Figures 20 & 21) continue tightening the flare nut until the nut is firmly on the pipe.

Outdoor Diameter (mm)	Tightening Torque (N. cm)	Additional Tightening Torque (N. cm)
1/4" (Φ 6.35)	1500 (153kgf.cm)	1600 (163kgf.cm)
3/8" (Φ 9.52)	2500 (255kgf.cm)	2500 (265kgf.cm)
1/2" (Φ12.7)	2500 (255kgf.cm)	3600 (367kgf.cm)

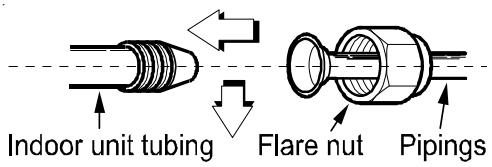


Figure 20

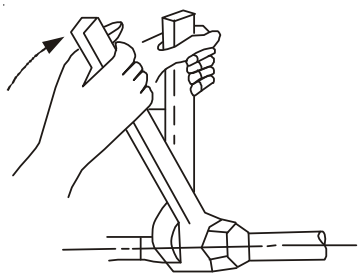


Figure 21

CAUTION

Do not over-tighten. Excessive torque can break the nut and/or crimp the pipe.

Electrical

WARNING

ONLY individuals meeting the requirements of an “Entry Level Technician”, at a minimum, as specified by the Air Conditioning, Heating and Refrigeration Institute (AHRI) may use this information. Attempting to install or repair this unit without such background may result in product damage, personal injury, or death.

WARNING

HIGH VOLTAGE!
Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death due to electric shock. Wiring must conform with NEC or CEC and all local codes. Undersized wires could cause poor equipment performance, equipment damage or fire.

IMPORTANT NOTES:

- If there are safety issues concerning the power supply, the unit should not be connected until safety issues are resolved.
- Ensure that the electrical power supply is sufficient to safely power and run the unit.
- Power voltage should range for 90% - 110% of the rated voltage.
- Main power switch and surge protector should be 1.5 times the capacity of the maximum current of the unit and should be installed in the power circuit.
- The unit is to be grounded per NEC.
- Connect all wiring as shown in the Electrical Wiring Diagram located on the panel of the outdoor unit.
- All wiring must comply with local and national electrical codes. Installation should be done by qualified electricians.

⚠ CAUTION

To avoid the risk of personal injury, wiring to the unit must be properly polarized and grounded.

- This unit should have a individual branch circuit.

NOTE: The wire gauge and the current rating of the fuse or breaker are determined by the minimum circuit ampacity and maximum overcurrent protection device that is indicated on the nameplate, located on the side panel of the unit. Refer to the nameplate before selecting the wire, fuse and/or breaker.

Connect the Cable to the Indoor Unit

NOTE: Before performing any electrical work, turn off the main power to the system.

⚠ WARNING

HIGH VOLTAGE!
Disconnect ALL power before servicing.
Multiple power sources may be present.
Failure to do so may cause property damage, personal injury or death.

1. The inside and outside connecting wire can be connected without removing the front grille.
2. Connecting wire between the indoor unit and outdoor unit should be approved, polychloroprine sheathed, flexible cord, type designation H07RN-F or heavier.
3. Lift up the indoor unit panel, remove the electrical box cover by loosening the screw as show in Figure 22.

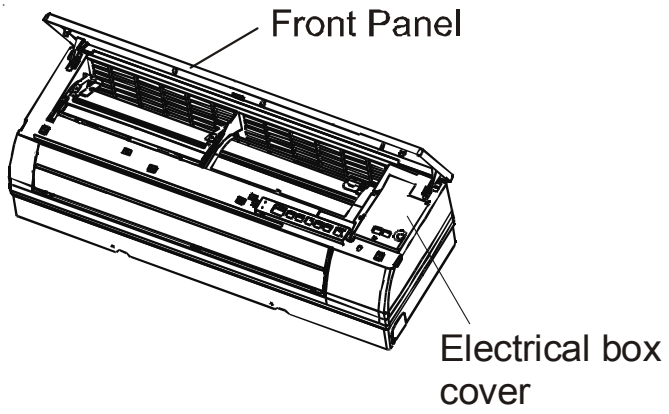


Figure 22

4. Ensure the color of the wires of the outdoor unit and the terminal numbers are the same as the indoor unit's.
5. Wrap the wires not connected with terminals with insulation tape, so they will not touch any electrical components. Secure the wires onto the control board with the cord clamp.

Connect the Cable to the Outdoor Unit

1. Remove the electrical control board cover from the outdoor unit by loosening the screw as shown in Figure 23.

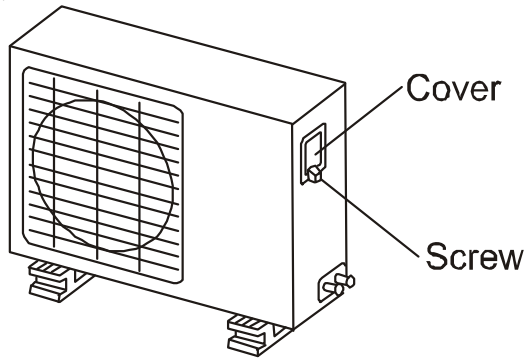
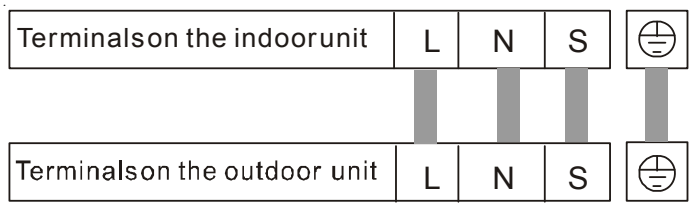
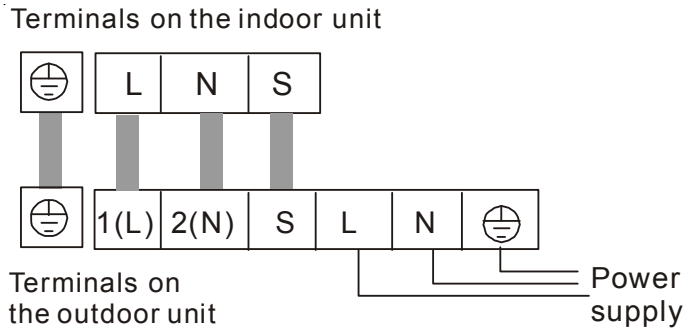


Figure 23

2. Connect the connective wires to the terminals, making sure the numbers on the indoor unit match with the numbers on the outdoor unit's terminal block. (See Models A and B.)



Model A



Model B

3. Secure the wire onto the control board with the cord clamp.
4. To prevent the ingress of water, form a loop of the connective wires as illustrated in the installation diagram of the indoor and outdoor units.
5. Insulate unused cords (conductors) with PVC-tape. Route them so they do not touch any electrical or metal parts.

IMPORTANT NOTES:

After the above conditions have been met, ensure the following notes are met:

1. A dedicated power circuit must be in place for the unit. Wire the unit as shown in the circuit wiring diagram that is posted inside the control cover.
2. Upon receipt of the unit, examine the screws fastening the wiring in the casing of the electrical fittings, since they may have become loose during transit. All must be fastened securely to prevent arcing.
3. Specification of power source.
4. Confirm electrical capacity is sufficient for operation of the unit.
5. Maintain the starting voltage at more than 90% of the rated voltage marked on the name plate.
6. Confirm the wire gauge is as specified in the power source specification.
7. Always install an earth leakage circuit breaker in a wet or moist area.
8. A drop in voltage may be caused by the vibration of a magnetic switch, causing damage to the contact point, fuse breakage, disturbance of the normal function of the overload.
9. The means to disconnect from a power supply should be incorporated in the fixed wiring and have an air gap contact separation of at least 1/8" (3 mm) in each active (phase) conductor.

Leak Testing (Nitrogen or Nitrogen-Traced)

Pressure test the system, using dry nitrogen and soapy water to locate any leaks in the system. If you wish to use a leak detector, charge the system to 10 psi using the appropriate refrigerant, then use nitrogen to finish charging the system to working pressure. Apply the detector to suspect areas. If leaks are found, repair them. After repair, repeat the pressure test. If no leaks exist, proceed to System Evacuation.

System Evacuation

Condensing unit liquid and suction valves are closed to contain the charge within the unit. The unit is shipped with the valve stems closed and caps installed. **Do not open valves until the system is evacuated.**

1. Connect the vacuum pump with 250 micron capability to the service valves.
2. Evacuate the system to 250 microns or less using suction **AND** liquid service valves. Using both valves is necessary as some compressor create a mechanical seal separating the sides of the system.
3. Close the pump valve and hold vacuum for 10 minutes. Typically, pressure will rise during this period.

NOTES:

- If the pressure rises to 1000 microns or less and remains steady, the system is considered leak-free; proceed to start-up.
- If pressure rises above 1000 microns but hold steady below 2000 microns, moisture and/or non-condensables may be present or the system may have a small leak. Return to step 2. If the same result is encountered, check for leaks as previously indicated and repair as necessary, then repeat evacuation.
- If pressure rises above 2000 microns, a leak is present. Check for leaks as previous indicated and repair as necessary then repeat evacuation.

Connective Pipe Length	Evacuation Method	Additional Amount of Refrigerant to be Charged
Less than 16' (5m)	Use Vacuum Pump	---
More than 16' (5m)	Use Vacuum Pump	R410A (Pipe Length-5) x 0.3 oz./ft. (20 g/m)

Pipe Length and Refrigerant Amount

- When relocating the unit to another place, perform the evacuation using a vacuum pump.
- Refrigerant added to the unit must be in liquid form. (Does not apply to units using R-22.)

Safe Refrigerant Handling

While these items will not cover every conceivable situation, they should serve as a useful guide.

WARNING

Refrigerants are heavier than air. They can "push out" the oxygen in your lungs or in any enclosed space.To avoid possible difficulty in breathing or death:

- **Never purge refrigerant into an enclosed room or space. By law, all refrigerants must be reclaimed.**
- **If an indoor leak is suspected, throughly ventilate the area before beginning work.**
- **Liquid refrigerant can be very cold. To avoid possible frostbite or blindness, avoid contact and wear gloves and goggles. If liquid refrigerant does contact your skin or eyes, seek medical help immediately.**
- **Always follow EPA regulations. Never burn refrigerant, as poisonous gas will be produced.**

WARNING

To avoid possible explosion:

- **Never apply flame or steam to a refrigerant cylinder. If you must heat a cylinder for faster charging, partially immerse it in warm water.**
- **Never fill a cylinder more than 80% full of liquid refrigerant.**
- **Never add anything other than R-22 to an R-22 cylinder or R-410A to an R-410A cylinder. The service equipment used must be listed or certified for the type of refrigerant used.**
- **Store cylinders in a cool, dry place. Never use a cylinder as a platform or a roller.**

WARNING

To avoid possible explosion, use only returnable (not disposable) service cylinders when removing refrigerant from a system.

- **Ensure the cylinder is free of damage which could lead to a leak or explosion.**
- **Ensure the hydrostatic test date does not exceed 5 years.**
- **Ensure the pressure rating meets or exceeds 400 lbs.**

When in doubt, do not use cylinder.

Use caution when handling the packed valve:

- Open the valve stem unit it comes in contact against the stopper. Do not attempt to open further.

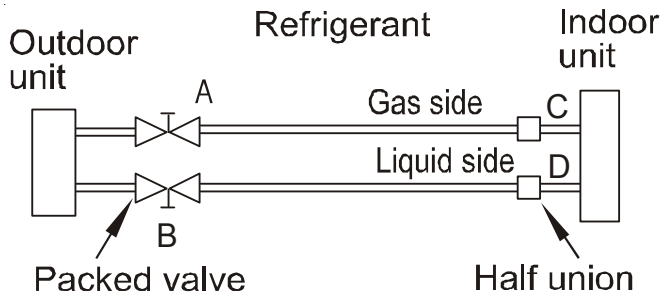


Figure 24

- Securely tighten the valve stem cap with a spanner or similar tool.
- See tightening torque table in Tightening Connection section.

Safety Check

After completing the electrical installation:

1. Grounding: After grounding the unit, measure the grounding resistance by visually inspecting the unit and by using a grounding resistance tester, making sure the grounding resistance is less than 4.0 ohms.
2. Electrical leakage check (to be performed during operation): During the test operation after complete installation of the unit, the qualified installer may use the electroprobe and multimeter to perform the electrical leakage check. Turn off the unit immediately if leakage occurs.

Test Running

After completing the gas leak check at the flare nut connections and electrical safety check, perform the test operation.

- Ensure all tubing and wiring have been properly connected.
- Make sure both the gas and liquid side service valves are fully open.

1. Connect the power; press the ON/OFF button on the remote control to turn the unit on.
2. Using the MODE button, select COOL, HEAT, AUTO and FAN to ensure all the functions are operating.
3. When the ambient temperature is lower than 63°F (17°C), the unit cannot be controlled by the remote control. To run in cooling mode, operation can be done manually. Manually controlling the unit is to be done only when the remote control is disabled or maintenance is required.
   - Grasp the panel sides and lift up the panel to an angle where it remains fixed and a clicking sound is heard.
   - Press the manual control button to select AUTO or COOL. The unit will operate under forced AUTO or COOL mode (see User's manual for more details).

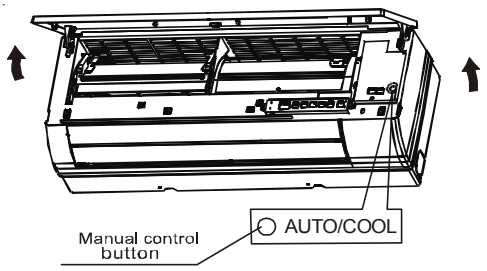


Figure 25

4. Test operation should last approximately 30 minutes.

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